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SF2A 2004
F. Combes, D. Barret, T. Contini, F. Meynadier and L. Pagani (eds)

B STARS POPULATION IN THE FIELD OF THE LARGE MAGELLANIC CLOUD NGC2004: FIRST RESULTS WITH VLT-FLAMES.

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Abstract. This document presents our very first results on a part of the program: "A study of the Be phenomenon in young open Galactic and Magellanic clusters". It concerns the B stars population in the LMC NGC2004 cluster and its surrounding field observed with the VLT/FLAMES instrumentation with the GIRAFFE spectrograph, at low resolution, in MEDUSA mode. First observational results which concern the ratio $\frac{Be}{B+Be}$, the nebulosities in the field and the discovery of spectrocopic binaries are presented.

1 Introduction

The main goal of this study is the determination of the Be stars population and its evolutionary state in several clusters of different age and metallicity, taking normal stars of different B sub-types as comparison stars.

2 Observations

The selection of targets was done using the EIS-preFLAMES survey; positions and B, V photometry were obtained by using the Sextractor software (Bertin & Arnouts 1996). Our list of targets includes Be stars observed by Keller et al (1999) and B stars (photometry criteria). The observations were performed in 2003 on November 24 and 28 and in 2004 on April 12 and 14 in setups LR02 and LR06 (programs 72.D-0245B and 73.D-0133A, GTO). Our sample contains about 180 stars.

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3 Results

3.1 Be stars and clusters

We observed 47 Be stars, 22 from Keller (1999) and 25 new Be stars located in 8 very small open clusters or in the surrounding region of NGC2004. The population ratio in the clusters is $\frac{Be}{B+Be} \simeq 36\%$ to be compared with 22% in NGC2004 (Maeder et al (1999). Outside these clusters, $\frac{Be}{B+Be} \simeq 15\%$ to be compared with 20% in the field of the Milky Way. Hence, a dependency on metallicity effect should not be present.

3.2 Nebular lines

Nebular lines of [SII], [NII], Hα, Hδ, Hγ are observed in more than two third of the sample. Their radial velocities (RV) show a bi-modal distribution (peaks at +305 km/s and +335 km/s). The distribution of stellar radial velocity has only a single peak around +300 km/s. So the nebular lines are not associated with the observed stars but probably come from filamentary regions.

3.3 Spectroscopic binaries

The variation of RV allows the detection of 21 new spectroscopic binaries (7 SB2). For SB2, it was possible to determine several parameters ($\frac{m1}{m2}$, RV of the system, possible period). The percentage of binaries is in agreement with the one in the B stars galactic population.

3.4 Fundamental parameters

We will perform an accurate determination of fundamental parameters of our sample in the LMC and the SMC, and clusters in the Milky Way to investigate the position of Be stars in evolutionary tracks to discriminate age (Fabregat & Torrejon 2000) and metallicity effects (Maeder et al 1999). To determine fundamental parameters (Teff, logg, Vsini, RV) we use a NLTE grid of stellar fluxes for a metallicity corresponding to the NGC2004 cluster (Korn et al 2002). Then we fit the theoretical spectra to the observations using the GIRFIT code developed by Y. Frémat.

References

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